these claims except that the prescribed steps are carried out in a disk drive controller having a processor executing computer software stored in a memory communicating with the processor via a local bus. The Examiner states that "Hughes teaches the need to selectively trace code within a disk drive controller without significantly slowing or stopping the system (see, for example, "Full speed ahead" on pp. 1-2). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to perform the method of Roediger within such a disk drive controller environment. One would be motivated to do so to apply a known runtime-controllable trace/profile system to eliminate bugs while avoiding potentially disastrous consequences associated with slowing or stopping such a known controller system."

Roediger and Hughes, however, are not properly combinable under 35 U.S.C. § 103(a) because the references do not suggest the desirability of the combination, and in fact teach away from the combination.

Roediger discloses a profiling system that can enable and disable collection of profile data during execution of a computer program. Roediger discloses inserting instrumentation code blocks into the program, which collect profile data during execution of the program. During execution of the program by the processor, whenever an instrumentation code block is encountered in the program, a dedicated profiling control bit is tested. If the bit is set, the instrumentation code is executed. Therefore, execution of the portions of the program not including the instrumentation code blocks is interfered with every time an instrumentation code block is encountered by the processor.

Hughes discloses a debugging system for system on chips (SoCs) having a processor and other components. Hughes discloses use of SoCs with a hard disk drive controller, and states that for this application, the processor must be run at "full speed." If the speed of the system is reduced, "the head will crash into the surface of the disk." Therefore, Hughes states that "[t]o investigate these bugs, we need to run the processor at its normal speed, but find a way of recording its behavior to allow investigation later." The debugging system accordingly disclosed by Hughes is an Embedded Trace Macrocell (EMT), which is very different from Roediger's

software profiler. Unlike Roediger's profiler, Hughes' EMT does not modify any part of the software being debugged because, as noted above, the processor must be run at full or normal speed. Hughes, instead, simply connects the EMT to the processor output to observe processor activity without interrupting or interfering with the execution of software by the processor or affecting processor performance. The processor is thereby allowed to run at full or normal speed, which it must do to avoid "disastrous" consequences.

Hughes, therefore, teaches away from using any technique for observing processor behavior that interferes with or interrupts processor activity because the processor must be run at full or normal speed. One skilled in the art would not consider using the teachings of Roediger, which, as mentioned above, require inserting instrumentation code blocks into the program, which when encountered by the processor require the processor to perform a number of responsive steps including testing a profiling control bit, and if the bit is set, executing the instrumentation code before returning to the program. This apparent interference with the operation of the processor would discourage one of ordinary skill in the art from combining the teachings of the references in the manner suggested by the Examiner.

In the Final Office Action, the Examiner states that "[i]f the teachings of Hughes are taken literally..., then it is implied that no disk drive controller can tolerate any overhead in the profiling procedure, because even the slightest reduction in speed would lead to catastrophic failure. However, this literal interpretation imposes a problem when Applicant's invention is analyzed in light of such an interpretation. Applicant does not purport to have invented a no-overhead profiling system..., and under the literal interpretation of Hughes advanced by Applicant, the instant invention, which fails to meet the zero-overhead requirement, would appear inoperable (thus, failing to meet the requirements of 35 U.S.C. §§ 101, 112). A more reasonable interpretation seems to be that disk drive controllers can tolerate some minimal overhead, and striving to reduce profiler overhead as much as possible would be a reasonable design motivation." The Examiner correctly notes that Applicants do not purport to have invented a no-overhead profiling system. However, the issue is not whether Applicants' system has no overhead, the issue is simply what is disclosed by the cited prior art references. As noted

above, Hughes clearly states that for its particular system using SoCs with a hard disk drive controller, the processor must be run at "full speed," and if the speed of the system is reduced, "the head will crash into the surface of the disk." Accordingly, Hughes uses an Embedded Trace Macrocell (EMT), which is very different from Roediger's software profiler. Unlike Roediger's profiler, Hughes' EMT does not modify any part of the software being debugged because the processor must be run at full or normal speed. One skilled in the art reading the Hughes disclosure would therefore be taught away from combining the teachings of Hughes and Roediger.

Therefore, the combination of Roediger and Hughes is improper, and the rejection of claims 1, 2, 4, 11, 18-27, 29, and 31-33 under 35 U.S.C. § 103(a) based on the combination of these references should be withdrawn. These claims include all the independent claims in the application (claims 1, 18, 20-26, and 31-33). The remaining rejected claims in the application all depend on these independent claims, and should also be allowed. The other cited references do not cure the deficiencies of Hughes and Roediger.

## II. Even When Combined, Roediger And Hughes Do Not Disclose All Claim Elements

Even assuming, for the sake or argument, that Roediger and Hughes are properly combinable under § 103, the combination does not disclose each and every element of the claims. The rejections of at least the following claims should be withdrawn for the additional reasons set forth below.

### A. Claims 2 and 3

Claim 2, which depends on independent claim 1, specifies:

> identifying an instruction in the computer executable program code that disables the set of computer executable program instructions from executing; and
> causing a change to the computer executable program code to counter the effect of the instruction.

The Examiner contends that these steps are disclosed by Roediger in col. 6, lines 18-32 set forth below:

> The critical aspect of this invention is enabling mechanism 19, which provides runtime control over the generation of profile data 30. Enabling mechanism 19 operates by inserting instructions that will cause control bit 11 in condition register 21 to be examined before the execution of any instrumentation code. If the bit 11 is enabled (e.g., has a value of "1") program control will cause the instrumentation code to be executed and therefore generate profile data. Conversely, if the bit 11 is not enabled (e.g., it is a "0"), program control will be routed around the instrumentation code such that it is not executed and therefore result in a condition where profile data is not generated. Thus, the generation of profile data during program execution is dependent upon the control bit 11 in condition register 21.

However, in this cited passage, Roediger only discloses use of a profile control bit 11 to enable or disable execution of instrumentation code. The profile control bit 11 is shown in Fig. 1 of the reference as part of condition register 21 in CPU 12, and separate from the memory 14 containing the instruction stream (object module 26). The control bit 11 is therefore not an instruction in the computer executable program code that disables the set of computer executable program instructions from executing as specified in the claim. Additionally, changing the control bit 11 does not change to the computer executable program code to counter the effect of the instruction also as specified in claim 2.

The final office action does not address this contention.

Claim 2 is therefore patentable over the combination of Roediger and Hughes for these additional reasons, as is claim 3, which depends on claims 2.

**B. Claims 26-30**

Independent claim 26 specifies identifying computer executable program code that includes at least one computer executable program instruction causing execution of analytical program instructions to be avoided, and performing a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions.

Roediger only discloses use of a profile control bit 11 to enable or disable execution of instrumentation code. The profile control bit 11 is shown in Fig. 1 of the reference as part of condition register 21 in CPU 12. The control bit 11 is not a computer executable program instruction causing execution of analytical program instructions to be avoided as specified in claim 26. Additionally, changing the control bit 11 in Roediger is not performing a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions also as specified in claim 26.

Independent claim 26 and dependent claims 27-30 are allowable over the cited references for these additional reasons.

**C. Claim 31**

Independent claim 31 specifies means for identifying computer executable program code that includes at least one computer executable program instruction causing execution of analytical program instructions to be avoided, and means for performing a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions. These elements are not disclosed or suggested by the combination of Roediger and Hughes. Claim 31 is therefore patentable over the cited references for this additional reason.

**D. Claim 32**

Independent claim 32 specifies an identifier identifying computer executable program code that includes at least one computer executable program instruction causing execution of analytical program instructions to be avoided, and a performer performing a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions. These elements are not disclosed or suggested by the combination of Roediger and Hughes. Claim 32 is therefore patentable over the cited references for this additional reason.

**E. Claim 33**

Independent claim 33 specifies a set of instructions causing a computer system to identify computer executable program code that includes at least one computer executable program instruction causing execution of analytical program instructions to be avoided, and to perform a change directed to the at least one computer executable program instruction to allow execution of the analytical program instructions. These elements are not disclosed or suggested by the combination of Roediger and Hughes. Claim 33 is therefore patentable over the cited references for this additional reason.

Claims 1-33 are pending in the present application. As the application is now believed to be in condition for allowance, issuance of a Notice of Allowance is respectfully requested.

The Commissioner is hereby authorized to charge any fee deficiency associated with this submission, or credit any overpayment to Deposit Account No. 08-0219.

Respectfully submitted,

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